

Economic Calculation and the Limits of Organization

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Economists have become increasingly frustrated with the textbook model of the firm. The “firm” of intermediate microeconomics is a production function, a mysterious “black box” whose insides are off-limits to respectable economic theory (relegated instead to the lesser disciplines of management, organization theory, industrial psychology, and the like). Though useful in certain contexts, the textbook model has proven unable to account for a variety of real-world business practices: vertical and lateral integration, geographic and product-line diversification, franchising, long-term commercial contracting, transfer pricing, research joint ventures, and many others. As an alternative to viewing the firm as a production function, economists are turning to a new body of literature that views the firm as an *organization*, itself worthy of economic analysis. This emerging literature is the best-developed part of what has come to be called the “new institutional economics.”¹ The new perspective has deeply enhanced and enriched our understanding of firms and other organizations, such that we can no longer agree with Ronald Coase’s 1988 statement that “[w]hy firms exist, what determines the number of firms, what determines what firms do . . . are not questions of interest to most economists” (Coase 1988a, p. 5). The new theory is not without its critics; Richard Nelson (1991), for example, objects that the new institutional economics tends to downplay discretionary differences among firms. Still, the new institutional economics—in particular, agency theory and transaction cost economics—has been

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¹For overviews of the new institutional economics and the theory of the firm, see Coase (1991); Furubotn and Richter (1991); Holmström and Tirole (1989), Langlois (1994b), and *Journal of Institutional and Theoretical Economics* (March 1993, March 1994, and March 1995). For a survey of related empirical work see Shelanski and Klein (1995).

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the subject of increasing attention in industrial organization, corporate finance, strategic management, and business history.²

This paper highlights some distinctive Austrian contributions to the theory of the firm, contributions that have been largely neglected, both inside and outside the Austrian literature. In particular, I argue that Mises's concept of economic calculation—the means by which entrepreneurs adjust the structure of production to accord with consumer wants—belongs at the forefront of Austrian research into the nature and design of organizations. There is a unique Austrian perspective on economic planning, a perspective developed over the course of the socialist calculation debate. As was recognized in the early Austrian reinterpretations of the calculation debate (Lavoie 1985, Kirzner 1988), Mises's conception of the problem faced by socialist planners is part and parcel of his understanding of how resources are allocated in a market system. Mises himself emphasized that planning is ubiquitous: "[E]very human action means planning. What those calling themselves planners advocate is not the substitution of planned action for letting things go. It is the substitution of the planner's own plan for the plans of his fellow men" (Mises 1947, p. 493). All organizations plan, and all organizations, public and private, perform economic calculation. In this sense, the calculation problem is much more general than has usually been realized.

With their unique perspective on markets and the difficulties of resource allocation under central planning, third- and fourth-generation Austrian economists have always implicitly understood the economics of organization. In this context, as Nicolai Juul Foss (1994, p. 32) notes in a recent issue of this *Review*, "it is something of a doctrinal puzzle that the Austrians have never formulated a theory of the firm." Foss points out that many elements of the modern theory of the firm—property rights, relationship-specific assets, asymmetric information, the principal-agent problem—appeared, at least in elementary form, in Austrian writings since the middle stages of the calculation debate. Indeed, Rothbard's treatment of firm size in *Man, Economy, and State* (1962) was among the first discussions to adopt explicitly the framework proposed by Ronald Coase in 1937, a framework that underlies most contemporary theorizing about the firm. Mises's discussion in *Human Action* (1949) of the role of financial markets foreshadows Henry Manne's seminal 1965 article on the market for corporate control along with the recent recognition of finance as an essential part of economics.

²The framework of transaction cost economics has already made it into textbook form: Kreps (1990, pp. 744–90), Rubin (1990), Milgrom and Roberts (1992), Baye and Beil (1994), and Acs and Gerlowski (1996).

Besides anticipating parts of the modern literature, Mises and Rothbard also introduced significant innovations, though this has not yet been generally recognized. Their contributions, while not part of a fully articulated, explicit theory of the firm, deserve attention and development, especially by those working on such issues from within the Austrian School.³ These contributions are Rothbard's application of the calculation problem to the limits of the firm, and Mises's discussion of how the financial markets both limit managerial discretion and perform the ultimate resource allocation task in a market economy.

The Textbook Theory of the Firm

In neoclassical economic theory, the firm as such does not exist at all. The "firm" is a production function or production possibilities set, a means of transforming inputs into outputs. Given the available technology, a vector of input prices, and a demand schedule, the firm maximizes money profits subject to the constraint that its production plans must be technologically feasible. That is all there is to it. The firm is modeled as a single actor, facing a series of relatively uncomplicated decisions: what level of output to produce, how much of each factor to hire, and so on. These "decisions," of course, are not really decisions at all; they are trivial mathematical calculations, implicit in the underlying data. In the long run, the firm may also choose an optimal size and output mix, but even these are determined by the characteristics of the production function (economies of scale, scope, and sequence). In short: the firm is a set of cost curves, and the "theory of the firm" is a calculus problem.

To be sure, these models are not advertised as realistic descriptions of actual business firms; their use is purely instrumental. As David Kreps (1990, p. 233)—himself much less sanguine about the merits of the traditional model than most—puts it: if real-world firms do not maximize profits as the traditional theory holds, "that doesn't mean that profit maximization isn't a good positive model. Only the data can speak to that, and then only after we see the implications of profit maximization for observable behavior." However, even granting instrumentalism its somewhat dubious merits,⁴ the production-function approach is unsatisfactory, because it isn't useful for understanding a variety of economic phenomena. The black-box model is really a theory about a *plant* or production process, not about a *firm*. A single firm can own and operate multiple

³I have in mind recent work by Boudreaux and Holcombe (1989), Foss (1993a, 1993b, 1993c), Langlois (1988, 1992a, 1992b), and Minkler (1993a, 1993b).

⁴For critiques of instrumentalism see Rizzo (1985) and Batemarco (1985). For references to the interpretative literature on Milton Friedman's 1953 essay on "positive economics"—the source of most economists' views on method—see Boland (1979), Caldwell (1980), and Musgrave (1981); all reprinted in Caldwell (1984) along with De Marchi (1988).

production processes. Similarly, two or more firms can contract to operate jointly a single production process (as in a research joint venture). If we want to understand the scale and scope of the firm as a legal entity, then, we must look beyond the textbook model.

Coase and Transaction Costs

Ronald Coase, in his celebrated 1937 paper on "The Nature of the Firm," was the first to explain that the boundaries of the organization depend not only on the productive technology, but on the costs of transacting business. In the Coasian framework, as developed and expanded by Williamson (1975, 1985, 1996), Klein, Crawford, and Alchian (1978), and Grossman and Hart (1986), the decision to organize transactions within the firm as opposed to on the open market—the "make or buy decision"—depends on the relative costs of internal versus external exchange. The market mechanism entails certain costs: discovering the relevant prices, negotiating and enforcing contracts, and so on. Within the firm, the entrepreneur may be able to reduce these "transaction costs" by coordinating these activities himself. However, internal organization brings another kind of transaction cost, namely problems of information flows, incentives, monitoring, and performance evaluation. The boundary of the firm, then, is determined by the tradeoff, at the margin, between the relative transaction costs of external and internal exchange. In this sense, firm boundaries depend not only on technology, but on organizational considerations; that is, on the costs and benefits of contracting.

The relative costs of external and internal exchange depend on particular characteristics of transaction: the degree to which relationship-specific assets are involved, the amount of uncertainty about the future and about trading partners' actions, the complexity of the trading arrangement, and the frequency with which the transaction occurs. Each matters in determining the preferred institutional arrangement (that is, internal versus external production), although the first—"asset specificity"—is held to be particularly important.⁵ Williamson (1985, p. 55) defines asset specificity as "durable investments that are undertaken in support of particular transactions, the opportunity cost of which investments are much lower in best alternative uses or by alternative users should the original transaction be prematurely terminated." This could describe a variety of relationship-specific investments, including both specialized physical and human capital, along with intangibles such as R&D and firm-specific knowledge or capabilities.

⁵Indeed, Williamson's transaction cost economics is sometimes described as the "governance" or asset-specificity branch of the New Institutional Economics, as opposed to the "measurement" or team production branch (associated with Alchian and Demsetz 1972).

The recent transformation of economists' thinking about the firm has been nicely summarized by Mark Roe (1994, p. vii):

Economic theory once treated the firm as a collection of machinery, technology, inventory, workers, and capital. Dump these inputs into a black box, stir them up, and one got outputs of products and profits. Today, theory sees the firm as more, as a management structure. The firm succeeds if managers can successfully coordinate the firm's activities; it fails if managers cannot effectively coordinate and match people and inputs to current technologies and markets. At the very top of the firm are the relationships among the firm's shareholders, its directors, and its senior managers. If those relationships are dysfunctional, the firm is more likely to stumble.⁶

With this new orientation, economic theory is playing an increasingly visible role in finance, accounting, management, and other areas once thought to be beyond the purview of economics.

Economic Calculation and the Limits to Firm Size

Unfortunately, the growing economics literature on the theory of the firm focuses mostly on the costs of market exchange, and much less on the costs of governing internal exchange. The new research has yet to produce a fully satisfactory explanation of the limits to firm size (Williamson 1985, chap. 6). In Coase's words, "Why does the entrepreneur not organize one less transaction or one more?" Or, more generally, "Why is not all production carried on in one big firm?" (Coase 1937, pp. 42–43). The theory of the limits to the firm is perhaps the most difficult and least well developed part of the new economics of organization. Existing contractual explanations rely on problems of authority and responsibility (Arrow 1974); incentive distortions caused by residual ownership rights (Grossman and Hart 1986; Holmström and Tirole 1989); and the costs of attempting to reproduce market governance features within the firm (Williamson 1985, chap. 6). It is here that Austrian theory has an obvious contribution to make, by applying Mises's theorem on the impossibility of economic calculation under socialism. Rothbard has shown how the need for monetary calculation in terms of actual prices not only explains the failures of central planning under socialism, but places an upper bound on firm size.

The Socialist Calculation Debate: A Brief Review

To understand Mises's position in the calculation debate, one must realize that his argument is not exclusively, or even primarily, about

⁶Austrians would add that capital, land, and labor—"management" included—are not the only inputs or factors of production. There is also *entrepreneurship* or uncertainty bearing, and what Rothbard (1962, pp. 538–41) calls *ownership* or the "decision-making factor." On this see also Mises (1949, pp. 291–52, and pp. 66–68) below.

socialism. It is about the role of prices for capital goods. Entrepreneurs make decisions about resource allocation based on their expectations about future prices, and the information contained in present prices. To make profits, they need information about all prices, not only the prices of consumer goods but the prices of factors of production. Without markets for capital goods, these goods can have no prices, and hence entrepreneurs cannot make judgments about the relative scarcities of these factors. In short, resources cannot be allocated efficiently. In any environment, then—socialist or not—where a factor of production has no market price, a potential user of that factor will be unable to make rational decisions about its use. Stated this way, Mises's claim is simply that efficient resource allocation in a market economy requires well-functioning asset markets. Because scholars differ about what Mises "really meant," however, it may be useful here to provide a brief review of the debate.

Before 1920, according to the standard account,⁷ socialist theorists paid little attention to how a socialist economy would work in practice, most heeding Marx's admonition to avoid such "utopian" speculation. Then Mises, known at the time mainly as a monetary theorist, published the sensational article later translated as "Economic Calculation in the Socialist Commonwealth" (1920).⁸ Mises claimed that without private ownership of the means of production, there would be no market prices for capital goods, and therefore no way for decisionmakers to evaluate the relative efficiency of various production techniques. Anticipating the later argument for "market socialism," Mises argued that even if there were markets for consumer goods, a central planner could not "impute" meaningful prices to capital goods used to produce them. In short, without market-generated prices for both capital and consumer goods, even the most dedicated planner would find it "impossible" to allocate resources according to consumer wants.

Throughout the 1920s and early 1930s Mises's argument became the focus of intense discussion within the German-language literature. Eventually it was agreed that Mises was correct at least to point out that a socialist society could not do without such things as money and prices, as some early socialists had suggested, and that there was no feasible way to set prices according, say, to quantities of labor time. Nonetheless, it was felt that Vilfredo Pareto and his follower Enrico Barone (1908) had shown that nothing was "theoretically" wrong with

⁷For examples of the "standard account" of the calculation debate see Schumpeter (1942, pp. 172–86) and Bergson (1948). My discussion of the "revisionist view" follows Hoff (1949), Salerno (1990), and Rothbard (1991).

⁸Other works that made arguments similar to that of Mises include N. G. Pierson's "The Problem of Value in the Socialist Community" (1902) and parts of Max Weber's *Economy and Society* (1921).

socialism, because the requisite number of demand and supply equations to make the system “determinate” would exist under either capitalism or socialism. If the planners could somehow get the necessary information on preferences and technology, they could in principle compute an equilibrium allocation of final goods.

The most important response to Mises, however, and the one almost universally accepted by economists, was what became known as “market socialism” or the “mathematical solution,” developed by Fred Taylor (1929), H. D. Dickinson (1933), Abba Lerner (1934), and Oskar Lange (1936–37). In a system of market socialism, capital goods are collective property, but individuals are free to own and exchange final goods and services. The system would work like this. First, the Central Planning Board chooses arbitrary prices for consumer and capital goods. At those prices, the managers of the various state-owned enterprises are instructed to produce up to the point where the marginal cost of each final good is equal to its price, and then to choose the input mix that minimizes the average cost of producing that quantity. Then, consumer goods prices are allowed to fluctuate, and the Central Planning Board adjusts the prices of capital goods as shortages and surpluses of the final goods develop. Resources would thus be allocated according to supply and demand, through a process of “trial-and-error” essentially the same as that practiced by the managers of capitalist firms. Lange’s contribution, it has generally been held, was to show that production under market socialism could be just as efficient as production under capitalism, since the socialist planners “would receive exactly the same information from a socialized economic system as did entrepreneurs under a market system” (Heilbroner 1970, p. 88).⁹

Market socialism was seen as an answer not only to Mises’s calculation problem, but also to the issue of “practicality” raised by Hayek and Lionel Robbins. Hayek, in his contributions to *Collectivist Economic Planning* (Hayek, ed., 1935a), later expanded in “The Competitive Solution” (1940) and his well-known papers “Economics and Knowledge” (1937) and “The Use of Knowledge in Society” (1945), and Robbins, in his *The Great Depression* (1934), had changed the terms of the debate by focusing not on the problem of calculation, but on the problem of knowledge. For Hayek and Robbins, the failure of socialist organization is due to a mechanism design problem, in that planners cannot allocate resources efficiently because they cannot obtain complete information on consumer preferences and resource availability. Furthermore, even if the planners were

⁹It would no doubt be gratuitous to point out that since the collapse of central planning in Eastern Europe the writer of that comment has changed his mind, writing that although “[f]ifty years ago, it was felt that Lange had decisively won the argument for socialist planning,” now “[i]t turns out, of course, that Mises was right” (Heilbroner 1990, p. 92).

somehow able to acquire these data, it would take years to compute the millions of prices used by a modern economy. The Lange–Lerner–Taylor approach claimed to solve this preference-revelation problem by trial-and-error, so no actual computations would be necessary.¹⁰

With the widespread acceptance of the theory of market socialism, there developed an “orthodox line” on the socialist calculation debate, neatly summarized in Abram Bergson’s well-known survey of “Socialist Economics” (1948) and in Joseph Schumpeter’s *Capitalism, Socialism and Democracy* (1942, pp. 172–86). According to this line, Mises first raised the problem of the possibility of economic calculation under socialism, only to be refuted by Pareto and Barone; Hayek and Robbins then “retreated” to the position that socialist planners could calculate in theory, but that in practice the information problem would make this too difficult; then the market socialists showed that trial and error would eliminate the need for complete information on the part of the planners. Therefore, the argument goes, economic theory *per se* can say nothing conclusive about the viability of central planning, and the choice between capitalism and socialism must be purely political.

Calculation versus Incentives

The orthodox line on socialist planning has been modified in recent years with the development of incentive and information theory. The differences between capitalism and socialism, it is now typically held, lie in the different *incentive* properties of the two systems. Centrally directed systems are thought to be subject to greater agency costs—managerial discretion, shirking, and so on—than market systems (see, for example, Winiecki 1990). After all, Lange himself warned that “*the real danger of socialism is that of a bureaucratization of economic life*” (Lange 1936–37, p. 109; italics in original).

As has been pointed out elsewhere (Rothbard 1991, pp. 51–52), however, the calculation debate was *not* primarily about agency or managerial incentives. The incentive problem had long been known¹¹

¹⁰Lange actually claimed years later that even market socialism would be made obsolete with the advent of high-speed computers, which could instantly solve the huge system of simultaneous equations for the central planner. “Were I to rewrite my [1936] essay today my task would be much simpler. My answer to Hayek and Robbins would be: So what’s the trouble? Let us put the simultaneous equations on an electronic computer and we shall obtain the solution in less than a second. The market process with its cumbersome *tâtonnements* appears old fashioned. Indeed, it may be considered as a computing device of the pre-electronic age” (Lange 1965, pp. 401–2). Obviously, Lange did not have much experience with a computer. Also, during his time as chairman of the Polish Economic Council in the 1950s, Lange never tried to put market socialism into practice (see Lange 1958).

¹¹We tend to forget just how old the idea of socialism is, that it is not a twentieth-century invention; the subtitle of Alexander Gray’s famous book *The Socialist Tradition* (1946) is “Moses to Lenin.”

(if not fully developed) and was expressed in the famous question: "Under socialism, who will take out the garbage?" That is, if everyone is compensated "according to his needs," what will be the incentive to do the dirty and unpleasant tasks; or, for that matter, any tasks at all? The traditional socialist answer was that self-interest is a *product* of capitalism, and that socialism would bring about a change in human nature. In the worker's paradise would emerge a "New Socialist Man," eager to serve and motivated only by the needs of his fellows. These early theorists seem to have assumed, to borrow the expression used by Oliver Williamson (1991, p. 18) in a critique of a more recent socialist proposal, "the abolition of opportunism by agencies of the state." Experience has exposed the charming naiveté of such notions.

But Mises's challenge to socialism is distinct from this well-known incentive problem.¹² Assume for the moment that everyone is willing to work just as hard under central direction as under a market system. There still remains the problem of exactly what directives the Central Planning Board will issue. The Board will have to decide what goods and services should be produced, how much of each to produce, what intermediate goods are needed to produce each final good, and so on. In a complex, modern economy with multiple stages of production, resource allocation requires the existence of money prices for capital goods, prices that under capitalism arise from an ongoing process of competitive bidding by entrepreneurs for the factors of production. This process cannot be replicated by input-output analysis, computer simulations, or any other form of artificial market. Mises's main point was that socialism fails because decision makers require meaningful prices for all of these factors to choose from the vast array of possible factor combinations. "Without recourse to calculating and comparing the benefits and costs of production using the structure of monetary prices determined at each moment on the market, the human mind is only capable of surveying, evaluating, and directing production processes whose scope is drastically reduced to the compass of the primitive household economy" (Salerno 1990, p. 52).

The distinction between calculation and incentives is important because the modern economics literature on organizational design—from transaction cost explanations of firm size, to public choice theories of bureaucracy, to recent work on market socialism and the "soft budget constraint" (Kornai 1986)—focuses primarily on incentive problems (possibly encouraged by Lange's famous warning about bureaucracy). Incentive theory asks how, within a specified relationship, a principal can get an agent to do what he wants him to do. Mises's problem, however,

¹²Mises does devote a section of the 1920 paper to "Responsibility and Initiative in Communal Concerns," but he clearly considers this a secondary problem for socialist planners, not the primary one.

was different: How does the principal know *what* to tell the agent to do? That is, just what activities ought to be undertaken? What investments should be made? Which product lines expanded and which ones contracted? The ideas developed in the calculation debate suggest that when organizations are large enough to conduct activities that are exclusively internal—so that no reference to the outside market is available—they will face a calculation problem as well as an incentive problem.

In this sense, market-socialist proposals are mostly irrelevant to the real problems of socialist organization. This is the case Mises himself sought to make in his critique of market socialism in *Human Action* (Mises 1949, pp. 694–711). There he complained that the market socialists—and, for that matter, all general equilibrium theorists—misconceive the nature of “the economic problem.” Lange, Lerner, and Taylor looked primarily at the problem of consumer goods pricing, while the crucial problem facing a modern economy concerns the capital structure: namely, in what way should capital be allocated to various activities? The market economy, Mises argued, is driven not by “management”—the performance of specified tasks, within a framework given to the manager—but by *entrepreneurship*, meaning the speculation, arbitrage, and other risk-bearing activities that determine just what the managerial tasks are. It is not managers but entrepreneurs, acting in the capital and money markets, who establish and dissolve corporations, create and destroy product lines, and so on. These are precisely the activities that even market socialism seeks to abolish. In other words, to the extent that incentives are important, what socialism cannot preserve is high-powered incentives not in management, but in entrepreneurial forecasting and decisionmaking.

Mises has been described as saying that it is unreasonable to expect managers of socialist enterprises to “play market,” to act as if they were managers of private firms where their own direct interests were at stake. This may be true, but Mises’s prime concern was that *entrepreneurs* cannot be asked to “play speculation and investment” (Mises 1949, p. 705). The relevant incentive problem, he maintains, is not that of the subordinate manager (the agent), who takes the problem to be solved as given, but that of the speculator and investor (the principal), who decides just what is the problem to be solved. Lange, Lerner, and Taylor see the market through a strictly static, neoclassical lens, where all the parameters of the system are given and only a computational problem needs to be solved. In fact the market economy is a dynamic, creative, evolving *process*, in which entrepreneurs—using economic calculation—make industries grow and shrink, cause new and different production methods to be tried and others withdrawn, and constantly change the range of available products. It is *these* features of market capitalism, and not the incentives of agents to work hard, that are lost without private property ownership.

Indeed, traditional command-style economies, such as that of the former U.S.S.R., appear to be able only to mimic those tasks that market economies have performed before; they are unable to set up and execute original tasks.

The [Soviet] system has been particularly effective when the central priorities involve catching up, for then the problems of knowing what to do, when and how to do it, and whether it was properly done, are solved by reference to a working model, by exploiting what Gerschenkron . . . called the "advantage of backwardness." . . . Accompanying these advantages are shortcomings, inherent in the nature of the system. When the system pursues a few priority objectives, regardless of sacrifices or losses in lower priority areas, those ultimately responsible cannot know whether the success was worth achieving. The central authorities lack the information and physical capability to monitor all important costs—in particular opportunity costs—yet they are the only ones, given the logic of the system, with a true interest in knowing such costs. (Ericson 1991, p. 21)

Without economic calculation, there is no way to figure out if tasks have been performed efficiently. Hence without markets for physical and financial capital—which determine what tasks will be performed and whether they have been performed adequately—an economic system has difficulty generating anything *new*, and must rely on outside references to tell it what to do. Of course, the only reason the Soviet Union and the communist nations of Eastern Europe could exist at all is that they never fully succeeded in establishing socialism worldwide, so they could use world market prices to establish implicit prices for the goods they bought and sold internally (Rothbard 1991, pp. 73–74). In Mises's words, these economies

were not isolated social systems. They were operating in an environment in which the price system still worked. They could resort to economic calculation on the ground of the prices established abroad. Without the aid of these prices their actions would have been aimless and planless. Only because they were able to refer to these foreign prices were they able to calculate, to keep books, and to prepare their much talked about plans. (Mises 1949, pp. 698–99)

As we will see below, the firm is in the same situation: it needs outside market prices to plan and evaluate its actions.

Rothbard and the Limits of Organization

Rothbard's main contribution to the theory of the firm was to generalize Mises's analysis of the problem of resource allocation under socialism to

the context of vertical integration and the size of the organization. Rothbard writes in *Man, Economy, and State* that up to a point, the size of the firm is determined by costs, as in the textbook model. But "the ultimate limits are set on the relative size of the firm by the necessity for *markets* to exist in every factor, in order to make it possible for the firm to calculate its profits and losses" (Rothbard 1962, p. 536). This argument hinges on the notion of "implicit costs." The market value of opportunity costs for factor services—what Rothbard calls "estimates of implicit incomes"—can be determined only if there are external markets for those factors (pp. 542–44). For example, if an entrepreneur hires himself to manage his business, the opportunity cost of his labor must be included in the firm's costs. But without an actual market for the entrepreneur's managerial services, he will be unable to figure out his opportunity cost; his balance sheets will therefore be less accurate than they would if he could measure his opportunity cost.

The same problem affects a firm owning multiple stages of production. A large, integrated firm is typically organized as groups of semi-autonomous business units or "profit centers," each unit or division specializing in a particular final or intermediate product. The central management of the firm uses the implicit incomes of the business units, as reflected in statements of divisional profit and loss, to allocate physical and financial capital across the divisions. More profitable divisions are expanded, while less profitable divisions are scaled back. Suppose the firm has an upstream division selling an intermediate component to a downstream division. To compute the divisional profits and losses, the firm needs an economically meaningful "transfer price" for the component. If there is an external market for the component, the firm can use that market price as the transfer price.¹³ Without a market price, however, a transfer price must be estimated in another way.

In practice, this is typically done on a cost-plus basis; sometimes, the buying and selling divisions are left free to bargain over the price (Eccles and White 1988; Shelanski 1993; King 1994). At the very least, any artificial or substitute transfer prices will contain less information than actual market prices; Rothbard (1962, p. 547) puts it more strongly, calling a substitute price "only an arbitrary symbol." In either case, firms relying

¹³Rothbard (1962, pp. 900–1, n. 56) notes that the implicit transfer price may be somewhat more or less than the existing market price, since the entry of either the buying or the selling division into the external market may bid the price up or down slightly. Unlike Hirshleifer (1956), then, Rothbard does not require the external market to be perfectly competitive for a market-based transfer price to be economically meaningful. For Rothbard, "thin" markets are adequate: all that is necessary to have a genuine "external market" is the existence of at least one other producer (seller) of the intermediate good.

Of course, if external prices are perfectly competitive, then the economy must be in a competitive general equilibrium, in which information is perfect and all contracts are complete, and in which there is thus no need for firms.

on these prices will suffer. "Not being able to calculate a price, the firm could not rationally allocate factors and resources from one stage [or division] to another" (p. 547). The use of internally traded intermediate goods for which no external market reference is available introduces distortions that reduce organizational efficiency. This gives us the element missing from contemporary theories of economic organization, an upper bound: the firm is constrained by the need for external markets for all internally traded goods. In other words, no firm can become so large that it is both the unique producer and user of an intermediate product; for then no market-based transfer prices will be available, and the firm will be unable to calculate divisional profit and loss and therefore unable to allocate resources correctly between divisions. As Rothbard puts it:

Since the free market always tends to establish the most efficient and profitable type of production (whether for type of good, method of production, allocation of factors, or size of firm), we must conclude that complete vertical integration for a capital-good product can never be established on the free market (above the primitive level). *For every capital good, there must be a definite market in which firms buy and sell that good.* It is obvious that this economic law *sets a definite maximum to the relative size of any particular firm on the free market.* . . . Economic calculation becomes ever more important as the market economy develops and progresses, as the stages and the complexities of type and variety of capital goods increase. Ever more important for the maintenance of an advanced economy, then, is the preservation of *markets* for all the capital and other producers' goods. (pp. 547–48; italics in original)

Like the centrally planned economy, the firm needs market signals to guide its actions; without them the firm cannot survive. Note that in general, Rothbard is making a claim only about the upper bound of the firm, not the incremental cost of expanding the firm's activities (as long as external market references are available). As soon as the firm expands to the point where at least one external market has disappeared, however, the calculation problem exists. The difficulties become worse as more and more external markets disappear, as "islands of noncalculable chaos swell to the proportions of masses and continents. As the area of incalculability increases, the degrees of irrationality, misallocation, loss, impoverishment, etc., become greater" (p. 548). In other words, the firm is limited by the extent to which markets exist for the goods it allocates internally. Without market prices for these goods, the firm must rely on relatively costly and inefficient methods of generating its own accounting prices, to perform internal calculations.¹⁴

¹⁴This does not mean that because external prices are necessary for large firms to

Significantly, it is at this point in the discussion in *Man, Economy, and State* (p. 548) that Rothbard launches into a discussion of the socialist calculation debate, making it obvious that the two issues are inextricably linked. The reason that a socialist economy cannot calculate is not that it is socialist, but because a single agent owns and directs all resources. Expanding on this point in his 1976 essay on "Ludwig von Mises and Economic Calculation Under Socialism," Rothbard explains:

There is one vital but neglected area where the Mises analysis of economic calculation needs to be expanded. For in a profound sense, the theory is not about socialism at all! Instead, it applies to *any* situation where one group has acquired control of the means of production over a large area—or, in a strict sense, throughout the world. On this particular aspect of socialism, it doesn't matter whether this unitary control has come about through the coercive expropriation brought about by socialism or by voluntary processes on the free market. For what the Mises theory focuses on is not simply the numerous inefficiencies of the political as compared to the profit-making market process, but the fact that a market for capital goods has disappeared. This means that, just as Socialist central planning could not calculate economically, no One Big Firm could own or control the entire economy. The Mises analysis applies to any situation where a market for capital goods has disappeared in a complex industrial economy, whether because of socialism or because of a giant merger into One Big Firm or One Big Cartel. (Rothbard 1976, p. 75)

The Mises analysis thus applies to any situation where the market for a particular capital good disappears because a firm has become so large that it is the unique producer and user of that capital good. As we have seen, such a firm will not be viable.

It is surprising that Rothbard's extension of Mises's argument has received virtually no attention in the Austrian literature, even though the point appears four times in *Man, Economy, and State* (p. 536, p. 543, pp. 547–48, and p. 585) and again in the 1976 essay.¹⁵ The argument

function efficiently, firms will necessarily become larger where external markets are "thick" or better developed. On the contrary, large firms typically arise precisely where external markets are poorly developed or hampered by government intervention; these are the kinds of circumstances that give entrepreneurs an advantage in coordinating activities internally. However, such firms are still constrained by the need for *some* external market reference.

¹⁵Lavoie briefly notes the Rothbard analysis in his *Rivalry and Central Planning* (1985, p. 62n). Fritz Machlup, in a comment on Rothbard's 1976 essay, says he is "intrigued" by the analogy between the central planner's problem and the firm's problem, calling it "an issue I have tried to sell in several of my publications . . . but unfortunately not with sufficient success" (Machlup 1976, p. 114). He cites an early book (Machlup 1934, esp. pp. 209–14) and a later article (Machlup 1974, esp. pp. 42–45 and 52–54), both published in German, on the problem of "artificial" transfer prices. The argument is also foreshadowed by Hayek in *Prices and Production* (1935b, p. 63) in a discussion on vertical integration.

needs further development and elaboration, which should prove a useful exercise because the contemporary literature on the size of the firm lacks an adequate explanation for the limits to organization. The Rothbard analysis also suggests a line of research in business strategy: all else equal, firms able to use market-based transfer prices should outperform, in the long run, firms using administered or negotiated transfer prices.¹⁶ As of yet, there is little empirical work on this topic, despite the possible emergence of an "Austrian school of strategy" (Jacobson 1992). A related issue that has received considerable attention, however, is the difficulty of allocating overhead or fixed cost across divisions. If an input is essentially indivisible (or nonexcludable), then there is no way to compute the opportunity cost of just the portion of the input used by a particular division (see Rogerson 1992, for a discussion of these problems).¹⁷ Firms with high overhead costs should thus be at a disadvantage relative to firms able to allocate costs more precisely between business units. Indeed, in the literature on cost accounting there has been some recent interest in "market simulation accounting" (Staubus 1986), by which firms try to assess the price at which an asset would trade in an active market, based on observed market prices and related information. The Rothbardian position on the limits to firm size suggests that the market simulation approach may prove a useful accounting technique.

By the time of the 1976 paper, Rothbard had adopted an explicitly Coasian framework in his discussion of the limits to firm size. His own treatment, Rothbard says,

serves to extend the notable analysis of Professor Coase on the market determinants of the size of the firm, or the relative extent of corporate planning within the firm as against the use of exchange and the price mechanism. Coase pointed out that there are diminishing benefits and increasing costs to each of these two alternatives, resulting, as he put it, in an "optimum" amount of planning" in the free market system. Our thesis adds that the costs of internal corporate planning become prohibitive as soon as markets for capital goods begin to disappear, so that the free-market optimum will always stop well short not only of One Big Firm throughout the world market but also of *any* disappearance of specific markets and hence of economic calculation in that product or resource. (Rothbard 1976, p. 76)

¹⁶This line of reasoning has interesting implications for the study of innovation. Since the innovating firm is more likely to be using unique intermediate goods, innovation carries with its benefits the cost of more severe internal distortions. Economic calculation is then another obstacle the innovator must overcome.

¹⁷Mises (1944, p. 32) recognized the problem of allocating overhead costs, mentioning this as a possible exception to the notion that divisional accounting costs can reflect "true" costs.

This is noteworthy because even as late as 1972, Coase was describing his 1937 paper as "much cited and little used" (Coase 1972, p. 62). Alchian and Demsetz's "Production, Information Costs, and Economic Organization" came out only in 1972, and Williamson's *Markets and Hierarchies* in 1975. Rothbard was thus among the earliest writers to develop and extend the Coasian perspective.

Managerial Discretion and the Financial Markets¹⁸

As mentioned above, much current research in the theory of the firm focuses on the agency problem. Under what conditions can managers exercise discretionary behavior? What kinds of rules, or mechanisms, can be designed to align the manager's interest with the owner's? Without effective rules, what actions will managers choose? An early application was the alleged "separation of ownership and control" in the modern corporation. Berle and Means (1932) argued that the modern firm is run not by its owners, the shareholders, but by salaried managers, whose interests are different from those of shareholders and include executive perks, prestige, and similar rewards. If the corporation is diffusely held, no individual shareholder has sufficient motivation to engage in (costly) monitoring of managerial decisions, and therefore discretion will flourish at the expense of the market value of the firm.

Henry Manne's essay, "Mergers and the Market for Corporate Control" (1965), responded that managerial discretion will be limited as long as there is an active market for control of corporations. When managers engage in discretionary behavior, the share price of the firm falls, and this invites takeover and subsequent replacement of incumbent management. Hence while managers may hold considerable autonomy over the day-to-day operations of the firm, the stock market places strict limits on their behavior.¹⁹ To be sure, there is a large and divergent literature on the effectiveness of the takeover mechanism in providing managerial discipline (see Romano 1992 for a summary). If managers desire acquisitions to increase their own prestige or span of control—to engage in "empire building"—then an unregulated market will generate "too many takeovers." Other critics point out that if the difference between the current (undervalued) price of the firm and its after-takeover market value is common knowledge, then the target firm's shareholders will refuse to tender their shares until the current

¹⁸This section is based on Klein (1994, pp. 397–98).

¹⁹There are other mechanisms to limit managers' discretionary activities, such as the market for managers itself; on this see Fama (1980). Williamson (1975) argues that the capital market, as an outside control device, tends to be less effective than an internal device, such as the adoption of the "M-form" structure. Fama's article, along with Manne's and several other important papers on this topic, is collected in Putterman, ed. (1986).

price is bid up, appropriating a share of the returns to the acquiring firm's shareholders. Under those conditions, the market will generate "too few" takeovers.²⁰

The central insight of Manne's paper is also found in Mises's *Human Action* (1949), in the passage distinguishing what Mises calls "profit management" from "bureaucratic management" (pp. 308–11). It is true, Mises acknowledges, that the salaried managers of a corporation hold considerable autonomy over the day-to-day operations of the firm. Nonetheless, the shareholders make the ultimate decisions about allocating resources to the firm, in their decisions to buy and sell stock:

[The Berle–Means] doctrine disregards entirely the role that the capital and money market, the stock and bond exchange, which a pertinent idiom simply calls the "market," plays in the direction of corporate business. . . . [T]he changes in the prices of common and preferred stock and of corporate bonds are the means applied by the capitalists for the supreme control of the flow of capital. The price structure as determined by the speculations on the capital and money markets and on the big commodity exchanges not only decides how much capital is available for the conduct of each corporation's business; it creates a state of affairs to which the managers must adjust their operations in detail. (p. 303)

Mises does not identify the takeover mechanism *per se* as a means for capitalists to exercise control—takeovers were much less popular before the late 1950s, when the tender offer began to replace the proxy contest as the acquisition method of choice—but the main point is clear: The true basis of the market system is not the product market, the labor market, or the managerial market, but the capital market, where entrepreneurial judgments are exercised and decisions carried out.²¹

²⁰The flaw in the latter argument is that shareholders will *not* in general have the same information as incumbent managers, outside "raiders," and other specialists. It is not in the small shareholder's interest to learn these details; that is why he delegates such responsibilities to managers in the first place. The raider who discovers a difference between a firm's current market value and its potential value under new management has an opportunity for an entrepreneurial profit (less the transaction costs of takeover). Because shareholders have delegated these responsibilities, they will not in general earn a share of this profit. As Rothbard (1962, p. 372) observes, however, since shareholders (owners) *choose* to delegate operational responsibility to managers—contracting out, if you will, for the managerial function—they themselves retain the ultimate rights of corporate control.

²¹Compare Rothbard (1962, p. 538): "Hired managers may successfully direct production or choose production processes. But the ultimate responsibility and control of production rests inevitably with the *owner*, with the businessman whose property the product is until it is sold. It is the owners who make the decision concerning how much capital to invest and in what particular processes. And particularly, it is the *owners* who must choose the managers. The ultimate decisions concerning the use of their property and the choice of the men to manage it must therefore be made by the owners and by no one else."

As discussed above, Mises's treatment of the importance of financial markets is also the key to his final rebuttal in *Human Action* to Lange, Lerner, and the other market-socialist critics of his calculation argument (Mises 1949, pp. 694–711). The market socialists, he argued, fail to understand that the main task performed by a market system is not the pricing of consumer goods, but the allocation of capital among various branches of industry. By focusing on production and pricing decisions within a *given* structure of capital, the socialists ignore the vital role of capital markets. Rothbard (1993) notes that the same criticism can be applied to the textbook, production-function model of the firm, where capital is also taken for granted. "Neoclassical microtheory talks about 'managers' producing up to the point where $MR=MC$, without ever talking about who or what is allocating capital to them. In short, neoclassical firms are implicitly assumed to have a fixed amount of capital allocated to them . . . and they can *only* use that capital to invest in their own firm and nowhere else. Hence, the nonsensical conclusion that each firm's manager will try to squeeze out the last cent of profit, pushing production until $MR=MC$." Fortunately, the new literature on transaction-cost determinants of contractual relations has begun to bring capital back into the received microtheory.

Finally, on the subject of the Berle–Means doctrine, Mises notes in *Human Action* that "the emergence of an omnipotent managerial class is not a phenomenon of the unhampered market economy," but a result of government policy (Mises 1949, p. 307). Here he expands upon his earlier analysis in *Bureaucracy* (1944), where he attacks the claim that bureaucracy follows naturally from firm size. Mises conceives of bureaucracy as rule-following, as opposed to profit-seeking, behavior. He reserves the term "bureaucratic management" for the governing of activities that have no cash value on the market. As long as a firm's inputs and outputs are bought and sold, the central management of the firm will have the information provided by market prices to evaluate the efficiency of the various branches and divisions within the firm. Then subordinate managers can be given wide discretion to make daily operational decisions.²² If an organization produces a good or service that has no market price—the output of a government agency, for example—then subordinate managers must be given specific instructions for how to perform their tasks.

²²Chapter 1 of *Bureaucracy*, on profit management and the sources of entrepreneurial profit, contains a remarkably lucid account of economic calculation under capitalism and its impossibility under socialism. "To the entrepreneur of capitalist society a factor of production through its price sends out a warning: Don't touch me, I am earmarked for another, more urgent need. But under socialism these factors of production are mute" (Mises 1944, p. 29).

Mises also provides a very Coase-like discussion of the make-or-buy decision, though without citation (p. 33).

The fact that managers in a private firm have latitude to make day-to-day decisions, Mises argues, does not make the firm "bureaucratic." "[N]o profit-seeking enterprise, no matter how large, is liable to become bureaucratic provided the hands of its management are not tied by government interference. The trend toward bureaucratic rigidity is not inherent in the evolution of business. It is an outcome of government meddling with business" (Mises 1944, p. 12). By this Mises means that government interference impedes the entrepreneur's use of economic calculation and the attempt to use prices to impose managerial discipline. Mises gives three examples (pp. 64–73): taxes and price regulations that interfere with corporate profits (distorting an important signal of managerial performance); laws that interfere with hiring and promotion (including the need to hire public relations staffs and legal and accounting personnel to comply with government reporting requirements); and the omnipresent threat of arbitrary antitrust or regulatory activity, in response to which entrepreneurs must become adept at "diplomacy and bribery" (p. 72).

Mark Roe (1994) develops a similar argument in his recent work on the politics of corporate finance. The phenomenon he calls "strong managers, weak owners" is not an outgrowth of the market process; it is the result of legal restrictions on firm ownership and control. In the U.S., for example, banks and other institutions are forbidden from owning firms; antitrust laws prohibit industrial combinations like the Japanese *keiretsu*; and anti-takeover restrictions dilute the disciplinary effects of the takeover mechanism. Laws that require diffuse ownership create what Roe terms the "Berle–Means corporation," in which "fragmented ownership shifts power in the firm to managers" (p. 93).²³ Absent such legal restrictions, Mises would argue, managerial autonomy is no inefficiency; it's an essential tool for operating a large, decentralized organization. But the firm must have accurate divisional accounting statements to evaluate managerial performance, and for this it needs the information contained in market prices.

Alternative Austrian Approaches: Knight, Uncertainty, and "Market-Based Management"

Recently, some Austrian economists have suggested that the Coasian framework may be too narrow, too squarely in the general-equilibrium tradition to deal adequately with Austrian concerns (Boudreaux and Holcombe 1989; Langlois 1994a). They contend that the contemporary theory of the firm, following Coase, retains the perspective of static equilibrium analysis and profit maximization over a fixed set of outcomes

²³On the relationship between corporate governance and economic performance, see also Gilson (1995).

with known probabilities. As an alternative, some writers propose the framework in Frank Knight's *Risk, Uncertainty, and Profit* (1921). The Knightian framework, they argue, offers genuine uncertainty, disequilibrium and process analysis, and thus a scope for real entrepreneurship — aspects purportedly more congenial to Austrians. "The Coasian and Knightian theories of the firm deal with the issue [of the existence of firms] from two different vantage points. The Coasian theory takes the inputs and outputs in the firm's production process as given, and models the firm as an organization that acts to minimize the costs of transforming these inputs into outputs. . . . However, in Knight's model, entrepreneurship is the primary role of the firm" (Boudreaux and Holcombe 1989, p. 152). Williamson's transaction cost economics, as characterized by Langlois (1994a, p. 175), does broaden the notion of cost minimization to include transaction costs as well as production costs, but it remains essentially a static exercise with a limited role for expectations: "Seldom does the theory give thought to the possibility that organizational forms may be influenced as much by environments that exist only as future possibilities, imagined or feared."

These descriptions, however, paint with too broad a brush; as Foss (1993c) has recently pointed out, there are "two Coasian traditions." One tradition, the nexus-of-contracts branch associated with Alchian and Demsetz (1972), studies the design of *ex ante* mechanisms to limit shirking when supervision is costly. Here the emphasis is on monitoring and incentives in an (exogenously determined) moral-hazard relationship. The aforementioned criticisms may apply to this branch of the modern literature, but they do not apply to the other tradition, the governance or asset-specificity branch, especially in Williamson's more heterodox formulation. Williamson's transaction cost framework incorporates non-maximizing behavior (bounded rationality); true, "structural" uncertainty or genuine surprise (complete contracts are held not to be feasible, meaning that all *ex post* contingencies cannot be contracted upon *ex ante*); and process or adaptation over time (trading relationships develop over time, typically undergoing a "fundamental transformation" that changes the terms of trade). In short, "at least some modern theories of the firm do not at all presuppose the 'closed' economic universe—with all relevant inputs and outputs being given, human action conceptualized as maximization, etc.—that [some critics] claim are underneath the contemporary theory of the firm" (Foss 1993a, p. 274). Stated differently, one can adopt an essentially Coasian perspective without abandoning the Knightian or Austrian view of the entrepreneur as an uncertainty-bearing, innovating decision maker.²⁴

²⁴Nor do all Coasian perspectives deny the importance of specialized knowledge or routines in determining a firm's capabilities or "core competence." Transaction cost

Similarly, the approach described in this paper differs from that advanced in the recent literature on "market-based management" (Ellig 1993; Ellig and Gable 1993). Market-based management is the philosophy that firm success depends critically on the ability to replicate market-like features within the organization. One of these is "internal markets" for intermediate goods (and services such as financial, legal, accounting, and R&D support) along with the establishment of strict profit-center divisions. Like market prices, these internal prices convey information about local circumstances. Other features include an explicit "mission" or recognition of the firm's core competence, clearly defined roles and responsibilities for lower-level employees (analogous to property rights in a market economy), employee rewards based on performance (a profit-and-loss system), a well-defined "corporate culture" (customs, behavioral norms), and decentralized decision making.

Underlying market-based management is the team-production or nexus-of-contracts model of the firm advanced by Alchian and Demsetz (1972), supplemented with the "capabilities" theory of Edith Penrose (1959), G. B. Richardson (1972), and David Teece (1980, 1982). This is not the appropriate place for an extended discussion of the capabilities view; suffice it to say that this literature has both its defenders and its detractors.²⁵ The relevant point here is that the literature on market-based management, like other writings in the nexus-of-contracts tradition, mischaracterizes the nature of "planning" within the firm. For example, it attributes to the Coase-Williamson tradition the view that "internal markets are doomed to failure, because the business firm is by nature a command hierarchy" (Ellig 1993, p. 9). The Coasian tradition, however, does not imply that firms do or should adopt a command-and-control structure; on the contrary, as we have already seen, the modern firm will tend to be significantly decentralized, so that managers and workers at all levels of operations can make use of local knowledge. All decisions are not made from above, by executive fiat; the "M-form" corporation described by Williamson and Chandler is a *blend* of market and hierarchy, of centralization and decentralization.

In other words, the entrepreneur does make *some* decisions by "fiat"; the firm is definitely a "taxis," rather than a "cosmos" (to use Hayek's esoteric terminology). This does not imply, however, that *all* decisions must be made from the top; we can agree with the market-based management literature that "neither central planning nor command-and-control are

economics, for example, simply holds that the need for *ex post* governance of contracts in the presence of relationship-specific investments, and not "tacit knowledge" *per se*, is the most useful way to think about the boundaries of the firm. For the case that Austrian economics is more compatible with the capabilities literature (for substantive, not only methodological, reasons), see Minkler (1993b) and Langlois (1944a).

²⁵For critical surveys see Conner (1991) and Teece, Pisano, and Shuen (1992).

the defining characteristics of a business firm" (p. 11). Indeed, given competition in the product and factor markets, firms will always tend to select the optimum amount of "market-like" features. The firm's problem, then, is not too much "conscious" planning; the crucial issue is whether these plans are made, and tested, from within a larger market setting. The entrepreneur's plans can be carried out, as we saw above, only when there are definite markets for all internally traded goods or activities. What firms need is not necessarily internal markets, but the information generated by market prices.

Conclusion

The purpose of this paper has been to highlight some Austrian contributions to the theory of the firm and to suggest directions for future research along the same lines. In particular, Rothbard's argument about the need for markets in intermediate goods, and how that places limits on the scale and scope of the organization, deserves further development. This may be a more fruitful exercise than some work in the alternative Austrian traditions.

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